

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
The Establishment of Policies and Service Rules)	
for the Broadcasting-Satellite Service at the 17.3-)	
17.7 GHz Frequency Band and at the 17.7-17.8)	
GHz Frequency Band Internationally, and at the)	
24.75-25.25 GHz Frequency Band for Fixed)	IB Docket No. 06-123
Satellite Services Providing Feeder Links to the)	
Broadcasting-Satellite Service and for the Satellite)	
Services Operating Bi-directionally in the 17.3-)	
17.8 GHz Frequency Band)	

THIRD REPORT AND ORDER

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By the Commission:

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I. INTRODUCTION

1. In this *Third Report and Order*, we adopt rules to mitigate ground path interference between the 17/24 GHz Broadcasting-Satellite Service (BSS) and the Direct Broadcast Satellite Service (DBS).¹ “Ground path” interference is interference that is caused by signals from transmitting DBS

¹ BSS is defined as “[a] radiocommunication service in which signals transmitted or retransmitted by space stations are intended for direct reception by the general public.” 47 CFR §2.1. DBS is the acronym used in the United States for Direct Broadcast Satellite Service. (continued....)

feeder-link earth stations operating in the 17.3-17.7 GHz frequency band into receiving earth stations of 17/24 GHz BSS operating in the same band.

II. BACKGROUND

2. In May 2007, the Commission released a *Report and Order and Further Notice of Proposed Rulemaking (Order and FNPRM)* adopting processing and service rules for the 17/24 GHz BSS.² The *Order and FNPRM* included a framework in which 17/24 GHz BSS space stations would operate at orbital locations spaced at 4.0° intervals, as set forth in Appendix F of the *Order and FNPRM* (known as Appendix F locations).³ The *FNPRM* sought comment on coordination parameters relating to space path and ground path interference in the 17 GHz band.⁴ Specifically, regarding ground path interference, the *FNPRM* requested comment on measures to minimize ground path interference from DBS feeder-link earth stations to receive BSS earth stations in the 17 GHz band.

3. On June 14, 2011, the Commission released a *Second Report and Order* adopting rules to mitigate space path interference between 17/24 GHz BSS space-to-Earth transmissions and receivers of DBS space stations that operate in the same frequency band.⁵ The *Second Report and Order* determined an off-axis power flux density (pfd)⁶ coordination trigger for 17/24 GHz BSS space stations, required a minimum orbital separation of 0.2° between 17/24 GHz BSS space stations and DBS space stations, and placed boundaries on orbital inclination and eccentricity of 17/24 GHz BSS space stations.⁷ The Commission also revised its information requirements to require 17/24 GHz BSS space station applicants to file predicted and measured transmitting antenna off-axis gain information and adopted procedures to enable pending applicants and existing authorization holders to file relevant information related to these rules.⁸

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States to describe the domestic implementation of the satellite service known internationally as BSS, which is subject to the International Radio Regulation BSS and feeder-link Plans contained in Appendices 30 and 30A. DBS is defined as “a radiocommunication service in which signals transmitted or retransmitted by Broadcasting-Satellite Service space stations in the 12.2-12.7 GHz band are intended for direct reception by subscribers or the general public.” 47 CFR §25.103. In this item, the term “17/24 GHz BSS” generally refers to the BSS operating on space-to-Earth (downlink) frequencies in the 17.3-17.8 GHz band and the corresponding Earth-to-space (uplink) frequencies in the 24.75-25.25 GHz band. In some cases, these 17/24 GHz BSS services will complement existing DBS operations.

² *The Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band*, Report and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd 8842 (2007) (“*Order and FNPRM*” or “*Order*” and “*FNPRM*” individually).

³ *Order and FNPRM*, 22 FCC Rcd 8842 at Appendix F.

⁴ *Id.* at 8902-17, paras. 148-188. Appendix A provides a list of the Comments, Reply Comments and Supplementary Comments and Supplementary Reply Comments filed.

⁵ *The Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band*, IB Docket No. 06-123, Second Report and Order, 26 FCC Rcd 8927 (2011) (“*Second R&O*”).

⁶ Power flux density is defined as the amount of power flow through a unit area within a unit bandwidth. The units of power flux density are those of power spectral density per unit area, namely watts per hertz per square meter. These units are generally expressed in decibel form as dB (W/Hz/m²), dB (W/m²) in a 4 kHz band, or dB (W/m²) in a 1 MHz band. 47 CFR § 25.103.

⁷ *Second R&O*, 26 FCC Rcd at 8928.

⁸ *Id.*

4. On October 7, 2015, the Commission's International Bureau issued a public notice inviting the public to file comments to refresh the record on issues related to ground path interference in the 17 GHz frequency band that were raised in the *FNPRM*, but which were not resolved in the *Second Report and Order*.⁹ This *Third Report and Order* addresses these ground path interference issues.

III. DISCUSSION

A. Grandfathering Existing DBS Uplink Facilities

5. The *FNPRM* sought comment on whether to “grandfather” licensed and operating DBS feeder-link earth stations so that they may continue to operate in the manner in which they were designed in reliance on the rules then in effect.¹⁰ The Commission tentatively concluded that existing DBS feeder-link stations should not be subject to new interference-mitigation requirements to protect 17/24 GHz BSS receive earth stations, noting that such feeder-link stations are relatively few in number and the majority are located in less populated areas that pose little risk of interference problems.¹¹ The Commission invited comment on its tentative conclusion, which all commenters supported.

6. We will not subject existing DBS feeder-link stations to new interference-mitigation requirements, and therefore we “grandfather” all such stations from application of the rules adopted in this *Third Report and Order*. Based on the comments received, there is a clear consensus for this approach,¹² and we find that the effect of such a grandfathered status will be minimal because there are currently six DBS feeder-link sites in the United States, and as Echostar notes, the majority of these sites are located in remote communities where there is unlikely to be substantial BSS activity.¹³ Furthermore, these feeder-link stations are a critical component of the DBS systems that provide video entertainment to tens of millions American viewers every day.¹⁴ We agree with commenters that it is important that these stations be grandfathered so that they may continue to operate in the manner in which they were designed in reliance on the rules then in effect, and to avoid imposing unnecessary burdens on the operation of these existing DBS feeder-link stations.¹⁵

B. Protection Zones for Existing DBS Uplink Facilities

7. The *FNPRM* proposed to define an area around existing DBS feeder-link earth stations within which co-frequency 17/24 GHz BSS receive earth stations could not claim protection from potential interference from DBS feeder-link earth station operations. Thus, there would be a “protection zone” for existing DBS feeder-link earth stations in which they could continue to operate without an obligation to alter their operations to protect 17/24 GHz BSS receive earth stations. The *FNPRM* proposed to limit any protection zone to an area surrounding the specific geographic location within the 17.3-17.7 GHz BSS band in which the DBS feeder-link earth station licensee was already authorized to transmit. The *FNPRM* invited comment on two protection zone options: (1) to set the boundary at some fixed distance from the DBS feeder-link earth station; or (2) to adjust that boundary to account for

⁹ *Commission Staff Invites Any Supplemental Information or Comments On Proposed Ground Path Interference Rules for 17/24 GHz Reverse Band Broadcast-Satellite Service (BSS) Operations*, IB Docket No. 06-123, DA 15-1147, Public Notice, 30 FCC Rcd 10883 (IB 2015).

¹⁰ *FNPRM*, 22 FCC Rcd 8903 at paras. 150-151.

¹¹ *Id.*

¹² See SES Americom Reply Comments at 2. See also AT&T Services (AT&T) Supplementary Comments at 2-3; Echostar Supplementary Comments at 2; SES Americom Supplementary Comments at 1-2.

¹³ See EchoStar Comments at 5.

¹⁴ See DIRECTV Comments at 7.

¹⁵ See SES Americom Comments at 3.

climate, terrain, or other considerations. The *FNPRM* also sought detailed comment on alternative approaches the Commission might adopt to address this issue.¹⁶

8. Commenters agree that neither a fixed boundary nor tailored protection zones is a feasible solution. SES Americom, for example, observes that “using a fixed distance to plot a protection zone is inherently inaccurate,”¹⁷ and argues that it would be “unwarranted” to require operators to “invest the resources needed to develop tailored protection zones for each feeder-link location.”¹⁸ SES Americom also points out that “defining an area surrounding a feeder-link site for interference protection purposes presents significant challenges”¹⁹ because “numerous factors affect the required separation distance between a 17/24 GHz BSS receiver and a DBS feeder-link site, and requiring a fixed distance would fail to account for these variables.”²⁰ EchoStar argues that a fixed boundary, while administratively and operationally attractive, is not workable, and although tailored protection zones would result in more realistic protection zone boundaries, implementing such zones would require significant data and analysis.²¹ Commenters claim that developing tailored protection zones for each feeder-link station would require significant resources,²² and that these expenses are unwarranted given the rules the Commission is adopting regarding updates and modifications to existing DBS feeder-link stations.²³

9. Based on the record, we decline to establish a protection zone around existing DBS feeder-link earth stations that transmit in the 17.3-17.7 GHz frequency band. On balance, we agree with the arguments against placing on existing DBS feeder-link stations the burden of defining protection zones around those stations, as we find that, for successful operation of 17/24 GHz BSS receive earth stations, the BSS operators can more easily and efficiently determine on an *ad hoc* basis the optimal separation distance between the operators’ receive earth stations and existing DBS feeder-link stations through analysis of each location’s particular factors and characteristics.

10. This approach is supported by all commenters. Although DIRECTV originally supported the adoption of a fixed protection zone at a distance of 30 kilometers around DBS feeder-link stations,²⁴ it later stated that it did not object to “each 17/24 GHz BSS operator...mak[ing] its own determination as to where potential subscribers would not be subject to excessive levels of interference from an existing DBS

¹⁶ *FNPRM*, 22 FCC Rcd 8904, paras. 152-55.

¹⁷ SES Americom Comments at 8.

¹⁸ *Id.*

¹⁹ *Id.* at 5.

²⁰ *Id.* at 2. See also DIRECTV Reply at 4 (observing that the separation distance required can fluctuate from location to location depending on many factors, including topography, obstructions, and uplink operational characteristics); SES Americom Comments at 6 (“In addition ... different areas of the country will have differing climate, rainfall and terrain conditions that will also mitigate groundpath interference”).

²¹ Echostar Comments at 5.

²² See Echostar Comments at 5-6, Echostar Supplementary Comments at 2-3; SES Americom Comments at 4, SES Americom Reply at 2; DIRECTV Reply at 4; AT&T Supplementary Comments at 2-3.

²³ See *infra*, Section III.C.

²⁴ DIRECTV Comments at 7. DIRECTV reasoned that establishing protection zones was likely to have minimal impact on deployment of 17/24 GHz BSS receivers for several reasons: there are few existing DBS feeder-link sites and such sites are usually in remote areas; the sites are likely to be shielded by nearby obstacles; the feeder-link antennas are likely to be pointed at high elevation angles; and many BSS subscribers would be able to shield their receive antennas by mounting them away from the DBS feeder-link stations. *Id.* at 8-9.

uplink site.”²⁵ Accordingly, we agree with commenters that the framework we adopt today is a more accurate and flexible approach than stipulating a specific protection zone.

C. Upgrades, Modifications, and Additions to Grandfathered Facilities

11. As discussed in Section A, the *FNPRM* tentatively concluded that existing DBS feeder-link earth stations would be “grandfathered” into any interference-mitigation rules adopted in this rulemaking procedure.²⁶ Commenters urged the Commission to make clear that any exemption afforded should apply to existing DBS feeder-link *sites*, and not just currently licensed earth *stations*, in order to protect the operators’ ability to expand their existing feeder-link sites.²⁷ The *FNPRM* proposed an alternative approach that would have defined a pfd level at the boundary of the protection zone that took into account the cumulative effect of any modified operations of the existing feeder-link station site.²⁸ If modified operations did not exceed this pfd level, the modification would not be subject to the new interference-mitigation requirements. The *FNPRM* sought comment on whether, and to what extent, adding new DBS feeder-link earth stations within one mile of an existing DBS feeder-link earth station was likely to increase the probability of harmful interference to 17/24 GHz BSS earth station receivers.

12. DIRECTV and SES Americom agree that existing DBS operators should be allowed to update or modify their existing sites without being subject to interference-mitigation requirements so long as the changes took place within a set distance from the existing site.²⁹ The majority of commenters also agree that a reasonable radius for modification of existing DBS feeder-link earth station sites is one kilometer from an existing station.³⁰ Given the need to balance the interests of DBS feeder-link and 17/24 GHz BSS operators, we find that it is appropriate to exclude from the interference-mitigation procedures adopted here new DBS feeder-link sites located within one kilometer of an existing site. This approach will allow necessary and reasonable additions or modifications to a site without significantly decreasing 17/24 GHz BSS operators’ areas of coverage.

13. We adopt a two-prong test that allows existing DBS feeder-link operators to modify their networks or add antennas (earth stations), as follows: (1) the aggregate pfd resulting from the addition of a new station or modification of an existing station cannot exceed the pfd generated by the existing station, measured at any point between three and ten meters above the ground; and (2) any new earth station antenna must be located within one kilometer of an existing authorized DBS feeder-link earth station antenna.³¹ Any modifications to existing sites or installations outside of these parameters will be subject to the interference-mitigation procedures we adopt in this *Third Report and Order*. We find that this two-pronged approach balances the need for DBS operators to modify their feeder-link sites while considering the future needs and interests of 17/24 GHz BSS operators, by limiting DBS feeder-link sites to a one kilometer increase in the area in which 17/24 GHz signals will be unprotected against potential interference from the feeder link stations.³²

D. Coordination between DBS and 17/24 GHz BSS Operators

14. While Section III.C. addresses a DBS operator’s reasonable expectation of continuity of operation of its existing feeder-link stations and sites, commenters agree that new DBS feeder-link

²⁵ DIRECTV Reply at 4.

²⁶ *FNPRM*, 22 FCC Rcd at 8903, para. 150.

²⁷ See DIRECTV Comments at 9; EchoStar Comments at 7; SES Americom Comments at 5.

²⁸ *FNPRM*, 22 FCC Rcd at 8905, para. 157.

²⁹ DIRECTV Comments at 11; SES Americom Comments at 4-5.

³⁰ DIRECTV Comments at 9; EchoStar Reply at 5; SES Americom Supplemental Reply at 3.

³¹ See SES Americom Reply at 2.

³² See SES Americom Reply Comment at 4.

stations and sites will need to be subject to some restrictions, including a coordination zone and methodology, in order to protect the interests of 17/24 GHz BSS operators.³³ The *FNPRM* observed that Commission rules do not contain a procedure to coordinate co-frequency DBS feeder-link earth stations with BSS terminals.³⁴ It also observed that the Commission should create a coordination methodology to allow new stations of one service to be established among existing stations of the other service.

1. Coordination Zone

15. The *FNPRM* considered several options for determining when co-frequency coordination would be required between new DBS feeder-link stations and 17/24 GHz BSS receive earth stations and requested comment on which, if any, of these options the Commission should adopt to facilitate 17/24 GHz operations.³⁵ The *FNPRM* proposed that the Commission establish “coordination zones,” or areas around DBS feeder-link earth stations in which DBS and BSS operators would be required to coordinate.³⁶ It proposed to define these areas based on the methodology outlined in Annex 3 of Appendix 7 of the ITU Radio Regulations, an approach that is consistent with other coordination rules successfully adopted by the Commission.³⁷ The *FNPRM* also noted, however, that Table 9b of Appendix 7, which includes data needed for determining the coordination zone for services in several frequency bands, does not include data needed for determining the coordination zone for services in the 17.3-17.8 GHz band.³⁸ For that reason the *FNPRM* proposed specific values for the parameters to be used for the determination of the coordination zone for this frequency band.

16. DIRECTV suggested modifications of the parameter values proposed by the Commission to account, in the coordination process, for the particular characteristics of DBS feeder-link earth stations and BSS receive earth stations.³⁹ Specifically, DIRECTV submitted that:

- p_0 should be 0.03%, which translates to 99.7% availability for the 17/24 GHz BSS receive terminal (as a result, p becomes 0.015%);
- M_s should be 2 dB to protect feeder-link stations in the Western states that have lower link margins;
- ϵ_{min} should be 20° , since no operator would be likely to place a feeder-link station in an area with a lower elevation angle (such as 5°);
- G_r should be 0, since the higher minimum elevation angle (20°) yields a lower gain toward the horizon for the 17/24 GHz BSS receive antenna; and
- T_e should be 150 K, which is approximately the thermal noise temperature at the terminal of DIRECTV’s Ka-band receive antennas operating in the 18.3-18.8 GHz band, and should be typical of 17/24 GHz BSS receive terminals.⁴⁰

³³ DIRECTV Comments at 21; EchoStar Comments at Technical Annex at 21; SES Americom Comments at 19, DIRECTV Reply at 27; EchoStar Reply at 13, SES Americom Reply at 15.

³⁴ See *FNPRM*, 22 FCC Rcd at 8905, para. 159.

³⁵ *Id.* at 8908, para. 164.

³⁶ *Id.* at 8905, para. 159.

³⁷ *Id.* at 8905, para. 160. See also *The Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band*, IB Docket No. 06-123, FCC 06-90, Notice of Proposed Rulemaking, 21 FCC Rcd 7426, 7454, at para. 59 (2006).

³⁸ See *NPRM* at 8905, para. 160.

³⁹ DIRECTV Comments at 11.

⁴⁰ *Id.* at 11. Substituting these parameters, the permissible interference power value ($Pr(p)$) becomes -148.2 dBW/MHz.

Both EchoStar and SES Americom support DIRECTV's modified parameter values for determining whether coordination is triggered in specific instances.⁴¹ In supplementary comments, however, SES Americom suggests that the parameter values proposed by DIRECTV rely on more conservative assumptions regarding potential interference in the 17.3-17.8 GHz band than those assumed in the *FNPRM* proposal and consequently yield more conservative results.⁴² In particular, SES proposes that the link performance margin M_s should be 2 dB instead of 5 dB, as previously suggested by DIRECTV.⁴³ In response, AT&T suggests a compromise under which the Commission would adopt a variable value for the link performance margin M_s based on the differing allowable downlink pfd for 17/24 GHz BSS in different regions. AT&T suggests that we adopt a value for the link performance margin M_s of 4.8 dB in the southeast continental United States (CONUS) and Alaska and Hawaii, 3.0 dB in the northeast CONUS, and 1.8 dB in the western CONUS. These margins match the allowable pfd values for each of these regions, with higher margins where the allowable pfd is smaller.⁴⁴

17. We adopt the parameter values suggested by AT&T as a compromise between our original proposal and the input from commenters, to calculate coordination areas for the 17.3-17.8 GHz band around new proposed DBS feeder-link sites. By doing this we adopt Commission rules for parameter values for the column that is currently blank in the Table 9b, Appendix 7 of the ITU Radio Regulations, which we incorporate by reference into the Commission's rules.⁴⁵ Table 9b has been the basis of other successful coordination regimes and is familiar to satellite operators, which should facilitate the coordination process. AT&T's suggested compromise makes the parameter values for determining coordination more complex, but better reflects the reality of the regional pfd limits in our rules. These parameters simply identify the threshold to determine whether coordination is required.⁴⁶ Once that threshold determination has been made, the coordination would be managed under the coordination methodology discussed below.

2. Coordination Information

18. The *FNPRM* invited comment on the methodology to be used to coordinate DBS feeder-link earth stations and 17/24 GHz BSS receive earth stations. Operators will continue to establish new DBS feeder-link and 17/24 GHz BSS receive earth stations as they expand their operations over time. The *FNPRM* referenced a similar situation in the *MVDDS Second R&O*, which addressed a frequency sharing situation that involved ground path interference issues and gradual build-out of interspersed earth stations in the 12 GHz frequency band, similar to the situation that we envision in the 17/24 GHz bands.⁴⁷

⁴¹ SES Americom Reply at 5. Although EchoStar acknowledges the accuracy of DIRECTV's proposed values, it suggests that the necessary coordination zone around the new site could be determined through use of the FCC's epfd contour software. EchoStar Reply at 6, n.7.

⁴² SES Americom Reply at 5.

⁴³ SES Americom Supplementary Comments at 3.

⁴⁴ AT&T Supplementary Reply at 3. AT&T submitted the filing on behalf of its subsidiaries and affiliates, including DIRECTV. The allowable downlink pfd for 17/24 GHz BSS in these regions can be found at 47 CFR §25.208(w).

⁴⁵ See *infra*, Appendix B, § 25.108.

⁴⁶ SES Americom Reply at 5.

⁴⁷ *FNPRM*, 22 FCC Rcd at 8909, para. 166 (citing *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range; Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates; and Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. to Provide a Fixed Service in the 12.2-12.7 GHz Band*, ET Docket No. 98-206, FCC 02-116, Memorandum Opinion and Order and Second Report and Order, 17 FCC Rcd 9614 (2002) (*MVDDS Second R&O*)).

To achieve successful sharing of the 12 GHz frequency band, the Commission adopted a coordination procedure that requires an MVDDS operator entering the market to satisfy certain requirements to protect established DBS customers.⁴⁸ The *FNPRM* sought comment on the adoption of a coordination procedure similar to the *MVDDS Second R&O*, including a requirement to complete frequency coordination with existing and planned 17/24 GHz BSS receive earth stations by all applicants for new (non-grandfathered) DBS feeder-link earth stations or new 17 GHz transmitting telemetry, tracking, and command stations.⁴⁹ The *FNPRM* also sought comment on whether a third-party frequency coordinator should be used to preserve confidentiality of customer information.⁵⁰

19. DIRECTV, EchoStar, and SES Americom concur that the Commission should use the rules governing DBS/MVDDS coordination as a model.⁵¹ Commenters also agree that entities proposing new DBS feeder-link earth stations should be required to resolve any potential interference with affected 17/24 GHz receive stations prior to licensing, similar to the requirement under Section 25.203(c) for coordination with terrestrial stations in other bands.⁵² Commenters agree that to facilitate coordination, the twelve data items identified in the *FNPRM* should be provided by entities proposing new DBS feeder-link earth stations.⁵³

20. Based on the support in the record, we adopt a coordination methodology for new DBS feeder-link earth stations that relies on the coordination procedure adopted in the *MVDDS Second R&O*, using a third-party coordinator to screen competitively-sensitive information. Accordingly, entities proposing new DBS feeder-link earth stations must resolve any potential interference with affected 17/24 GHz BSS receive stations prior to licensing, similarly to what is required under 25.203(c) for coordination with terrestrial stations, by providing to a third-party coordinator the following twelve data items identified in the *FNPRM*:

- (i) The geographical coordinates of the proposed earth station antenna(s);
- (ii) Proposed operating frequency band(s) and emission(s);
- (iii) Antenna diameter (meters);
- (iv) Antenna center height above ground and ground elevation above mean sea level;
- (v) Antenna gain pattern(s) in the plane of the main beam;
- (vi) Longitude range of geostationary satellite orbit (GSO) satellites at which an antenna may be pointed;
- (vii) Horizon elevation plot;
- (viii) Antenna horizon gain plot(s) determined in accordance with the procedure in Section 2.1 of Annex 5 to Appendix 7 of the ITU Radio Regulations;
- (ix) Minimum elevation angle;
- (x) Maximum equivalent isotropically radiated power (e.i.r.p.) density in the main beam in any 1 MHz band;
- (xi) Maximum available RF transmit power density in any 1 MHz band at the input terminals of the antenna(s);
- (xii) A plot of the coordination distance contour(s) and rain scatter coordination distance contour(s) as determined by Table 2 of Section 3 to Appendix 7 of the ITU Radio Regulations.⁵⁴

⁴⁸ *FNPRM*, 22 FCC Rcd at 8909-10, para. 167 (citing 47 CFR § 101.144(d)).

⁴⁹ *FNPRM*, 22 FCC Rcd at 8909-10, para. 167.

⁵⁰ *See id.* at 8910, para. 168.

⁵¹ SES Americom Comments at 8; DIRECTV Comments at 13; EchoStar Comments at 8.

⁵² SES Americom Comments at 8; DIRECTV Comments at 13; EchoStar Comments at 8.

⁵³ SES Americom Comment at 8; DIRECTV Comments at 13.

⁵⁴ *See FNPRM*, 22 FCC Rcd at 8910, para. 169.

21. We recognize that this coordination requirement may involve 17/24 GHz BSS receive earth stations that are authorized pursuant to a “blanket” license, through which multiple earth stations may be operated anywhere in the licensed geographic area, often the entire United States.⁵⁵ Authorization of 17/24 GHz BSS earth stations pursuant to blanket licenses raises the possibility that DBS licensees may be prevented from constructing new DBS feeder-links sites because in principle a BSS blanket earth station licensee is entitled to protection from interference at every point in the United States. We remind licensees that the Commission has a long-standing policy of expecting all parties to satellite system coordination to exercise good faith.⁵⁶ If any such coordination difficulty does arise, the International Bureau will be ready to work with the parties involved in order to ensure successful sharing of the 17 GHz band.

E. Other Measures to Protect 17/24 GHz BSS Operations

22. The *FNPRM* invited comment on whether any additional measures were necessary to protect 17/24 GHz BSS receive earth stations from harmful interference from DBS feeder-link earth stations. These potential additional measures included: (1) limits on DBS feeder-link earth station e.i.r.p. toward the horizon; (2) placement of new DBS feeder-link facilities in low-population density areas; (3) technical showing requirements for co-located DBS and 17/24 GHz BSS receive earth stations; and (4) antenna shielding requirements.⁵⁷

23. Commenters generally stated that once the coordination requirement has been triggered per the methodology discussed above, the parties to that coordination should have flexibility with respect to how potential interference is evaluated and resolved.⁵⁸ DIRECTV advocated limiting new DBS feeder-links to areas with a low population density and mandating the use of artificial or natural shielding,⁵⁹ but all other commenters opposed these measures, arguing that the Commission should not prejudice the means by which interference challenges are addressed between operators.⁶⁰

24. We decline to adopt any additional interference mitigation measures. We agree with commenters who assert that the coordination methodology we adopt here is sufficient to prevent harmful ground path interference between DBS feeder-link earth stations and BSS receive earth stations.⁶¹ We also agree with commenters that this flexible approach is preferable to the alternative of adopting “across-the-board rules” to mitigate inference, such as requiring new DBS feeder-link earth stations to be located in rural areas, employ shielding, or comply with e.i.r.p. limits.⁶² We agree that affected parties should have the flexibility to make decisions regarding the siting, shielding, and power levels of proposed new

⁵⁵ A blanket license is a “license for multiple fixed or mobile earth stations or SDARS terrestrial repeaters that may be operated anywhere within a geographic area specified in the license, or for multiple non-geostationary-orbit space stations.” 47 CFR § 25.103.

⁵⁶ See, e.g., 2000 Biennial Regulatory Review -- Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum Usage by, Satellite Network Earth Stations and Space Stations; Streamlining the Commission's Rules and Regulations for Satellite Applications and Licensing Procedures, IB Docket Nos. 00-248, 95-117, Eighth Report and Order and Order on Reconsideration, 23 FCC Rcd 15099, 15112 at para. 50 (2008).

⁵⁷ *FNPRM*, 22 FCC Rcd at 8911, para. 170.

⁵⁸ SES Americom Comments at 8; EchoStar Reply at 7.

⁵⁹ DIRECTV Comments at 14.

⁶⁰ SES Americom Reply at 5-6; EchoStar Reply at 7.

⁶¹ Echostar Comments at 7; SES Americom Comments at 8, Reply at 5, Supplementary Comments at 2, Supplementary Reply at 2; DIRECTV Reply at 4. But see DIRECTV Comments at 7; AT&T Supplementary Comments at 5.

⁶² SES Americom Comments at 8; EchoStar Reply at 7.

DBS feeder-link earth stations based on the facts and coordination considerations in each individual case, rather than prescribing “across-the-board” limits on the deployment of such new feeder-link stations.

IV. PROCEDURAL MATTERS

A. Regulatory Flexibility Act

25. As required by the Regulatory Flexibility Act, 5 U.S.C. § 603, an Initial Regulatory Flexibility Analysis was incorporated into the *FNPRM*. Pursuant to the Regulatory Flexibility Act of 1980, as amended, the Commission has prepared a Final Regulatory Flexibility Analysis (FRFA) regarding the possible significant economic impact on a substantial number of small entities of the rules adopted in this *Third Report and Order*. The FRFA is set forth in Appendix C.

B. Paperwork Reduction Act of 1995

26. This Report and Order contains new or modified information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. The requirements will be submitted to the Office of Management and Budget (OMB) for review under Section 3507(d) of the PRA. OMB, the general public, and other Federal agencies are invited to comment on the new or modified information collection requirements contained in this proceeding.

27. Pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, see 44 U.S.C. 3506(c)(4), we previously sought specific comment on how the Commission might further reduce the information collection burden for small business concerns with fewer than 25 employees. We received no comments on this issue. We have assessed the effects of the revisions adopted that might impose information collection burdens on small business concerns, and find that the impact on businesses with fewer than 25 employees will be minimal.

V. ORDERING CLAUSES

28. Accordingly, IT IS ORDERED that, pursuant to the authority contained in Sections 1, 4(i), 4(j), 7(a), 301, 303(c), 303(f), 303(g), 303(r), 303(y), and 308 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), 154(j), 157(a), 301, 303(c), 303(f), 303(g), 303(r), 303(y), 308, this *Third Report and Order* IS ADOPTED.

29. IT IS FURTHER ORDERED that Part 25 of the Commission’s Rules, 47 CFR 25 IS AMENDED as specified in Appendix B.

30. IT IS FURTHER ORDERED that this Third Report and Order SHALL BE effective 30 days after publication in the Federal Register, except the amendments to sections 25.108 and 25.203, 47 CFR §§ 25.108 and 25.203, which contain new or modified information collection requirements that require approval by the Office of Management and Budget under the Paperwork Reduction Act, WILL BECOME EFFECTIVE after the Commission publishes a notice in the Federal Register announcing such approval and the relevant effective date.

31. IT IS FURTHER ORDERED that, pursuant to Section 801(a)(1)(A) of the Congressional Review Act, 5 U.S.C. § 801(a)(1)(A), the Commission SHALL SEND a copy of this Report and Order to Congress and to the Government Accountability Office.

32. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Third Report and Order, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

List of Commenters

Comments were filed by:

DIRECTV, Inc.
EchoStar Satellite LLC
SES Americom, Inc.

Reply comments were filed by:

DIRECTV, Inc.
SES Americom, Inc.

Supplementary comments were filed by:

AT&T Services, Inc.
EchoStar Satellite Operating Corporation and DISH Network L.L.C.
SES Americom, Inc.

Supplementary reply comments were filed by:

AT&T Services, Inc.
SES Americom, Inc.

APPENDIX B

Final Rules

The Federal Communications Commission amends Title 47 of the Code of Federal Regulations, Part 25, as follows:

PART 25 – SATELLITE COMMUNICATIONS

1. The authority citation for Part 25 continues to read as follows:

Authority: Interprets or applies 47 U.S.C. 154, 301, 302, 303, 307, 309, 310, 319, 332, 605, and 721 unless otherwise noted.

2. In § 25.108, add paragraph (b)(2) to read as follows:

* * * * *

(2) ITU Radio Regulations, Volume 2: Appendices, Appendix 7, “Methods for the determination of the coordination areas around an earth station in the frequency bands between 100 MHz and 105 GHz,” Edition of 2012, <http://www.itu.int/pub/R-REG-RR-2012>. Incorporation by reference approved for §25.203(m).

* * * * *

3. Amend subparagraphs (2), (3), (4), and (5) of § 25.108(b) to be subparagraphs (3), (4), (5), and (6) respectively.

4. In § 25.203, add paragraph (m) to read as follows:

* * * * *

(m) Feeder links to DBS space stations

(1) Each applicant for a license to construct a new FSS earth station to provide feeder-link service to DBS space stations in the frequency band 17.3-17.8 GHz, or to modify any such station currently authorized except where the modification is for a new station within one kilometer of a currently-licensed earth station and modification will not increase the aggregate pfd, measured at any point 3-10 meters above the ground, above that generated by the current earth station, shall identify a coordination zone around its proposed new or modified earth station by the methodology outlined in Annex 3 of Appendix 7 of the ITU Radio Regulations, using the following values for the parameters in Table 9b of Annex 7 of Appendix 7:

Space service designation in which the transmitting earth station operates	Fixed-satellite
Frequency bands (GHz)	17.3-17.8
Space service designation in which the receiving earth station operates	Broadcasting-satellite
Orbit	GSO
Modulation at receiving earth station	N (digital)

Receiving earth station interference parameters and criteria	p_o (%)	0.015		
	n	2		
	p (%)	0.015		
	N_L (dB)	1		
	M_s (dB)	In the area specified in 47 CFR § 25.209(w)(1) and (4)	In the area specified in 47 CFR § 25.209(w)(2)	In the area specified in 47 CFR § 25.209(w)(3)
		4.8	3.0	1.8
	W (dB)	4		
Receiving earth station parameters	G_m (dBi)	36		
	G_r	0		
	ϵ_{min}	20°		
	T_e (K)	150		
Reference bandwidth	B (Hz)	10^6		
Permissible interference power	$P_r(p)$ (dBW) in B	-146.8	-149.8	-152.8

(2) Each applicant for such new or modified feeder-link earth station shall provide the following information to a third-party coordinator of its choice for use in coordination required by this paragraph:

- (i) The geographical coordinates of the proposed earth station antenna(s);
- (ii) Proposed operating frequency band(s) and emission(s);
- (iii) Antenna diameter (meters);
- (iv) Antenna center height above ground and ground elevation above mean sea level;
- (v) Antenna gain pattern(s) in the plane of the main beam;
- (vi) Longitude range of geostationary satellite orbit (GSO) satellites at which an antenna may be pointed;
- (vii) Horizon elevation plot;
- (viii) Antenna horizon gain plot(s) determined in accordance with the procedure in Section 2.1 of Annex 5 to Appendix 7 of the ITU Radio Regulations;
- (ix) Minimum elevation angle;
- (x) Maximum equivalent isotropically radiated power (e.i.r.p.) density in the main beam in any 1 MHz band;
- (xi) Maximum available RF transmit power density in any 1 MHz band at the input terminals of the antenna(s);
- (xii) A plot of the coordination distance contour(s) and rain scatter coordination distance contour(s) as determined by Table 2 of Section 3 to Appendix 7 of the ITU Radio Regulations.

(3) Each applicant for such new or modified feeder-link earth stations shall file with its application memoranda of coordination with each licensee authorized to construct BSS receive earth stations within the coordination zone.

APPENDIX C

Final Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹ an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the *Order and FNPRM* in this proceeding.² The Commission sought written public comment on the proposals in the *NPRM*, including comment on the IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.³

A. Need for, and Objectives of, the Report and Order

The objective of the Report and Order is to adopt processing and service rules for the 17/24 GHz Broadcasting-Satellite Service (BSS) which will address potential interference scenarios which arise in the reverse band operating environment. The rules will mitigate against ground path interference. Specifically, we adopt criteria to facilitate sharing in the 17 GHz bands by BSS and Direct Broadcast Satellite (DBS) services. These new rules will introduce a new generation of broadband services to the public, providing a mix of local and domestic video, audio, data, video-on-demand, and multimedia services to consumers in the United States. In some cases, these new BSS services will complement existing DBS services. By these actions, we facilitate the introduction of new and innovative services to consumers in the United States and promote increased competition among satellite and terrestrial services.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA

There were no comments filed that specifically addressed the rules and policies proposed in the IRFA.

C. Response to Comments by the Chief Counsel for Advocacy of the Small Business Administration

The Chief Counsel did not file any comments in response to the proposed rules in this proceeding.

D. Description and Estimate of the Number of Small Entities to Which Rules Will Apply

The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the rules adopted herein.⁴ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”⁵ In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.⁶ A small business concern is one

¹ See 5 U.S.C. § 603. The RFA (*see* 5 U.S.C. § 601 – 612), has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

² See *The Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band*, Report and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd 8842 (2007) at Appx. H.

³ See 5 U.S.C. § 604.

⁴ 5 U.S.C. § 604(a)(3).

⁵ 5 U.S.C. § 601(6).

⁶ 5 U.S.C. § 601(3) (incorporating by reference the definition of “small business concern” in 15 U.S.C. § 632). Pursuant to the RFA, the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after the opportunity for public comment,

(continued....)

which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).⁷ Below, we further describe and estimate the number of small entity licensees that may be affected by the adopted rules.

Satellite Telecommunications. The SBA has developed a small business size standard for the two broad census categories of “Satellite Telecommunications” and “Other Telecommunications.” Under both categories, a business is considered small if it has \$13.5 million or less in annual receipts.⁸ The category of Satellite Telecommunications “comprises establishments primarily engaged in providing point-to-point telecommunications services to other establishments in the telecommunications and broadcasting industries by forwarding and receiving communications signals via a system of satellites or reselling satellite telecommunications.”⁹ For this category, Census Bureau data for 2007 show that there were a total of 512 satellite communications firms that operated for the entire year.¹⁰ Of this total, 307 firms had annual receipts of under \$10 million per firm, and 26 firms had receipts of \$10 million to \$24,999,999 per firm.¹¹ Consequently, we estimate that the majority of Satellite Telecommunications firms are small entities that might be affected by our action.

The category of Other Telecommunications “comprises establishments primarily engaged in (1) providing specialized telecommunications applications, such as satellite tracking, communications telemetry, and radar station operations; or (2) providing satellite terminal stations and associated facilities operationally connected with one or more terrestrial communications systems and capable of transmitting telecommunications to or receiving telecommunications from satellite systems.”¹² For this category, Census Bureau data for 2007 show that there were a total of 2,383 firms that operated for the entire year.¹³ Of this total, 482 firms had annual receipts of under \$25 million.¹⁴ Consequently, we estimate that the majority of Other Telecommunications firms are small entities that might be affected by our action.

Space Stations (Geostationary). Commission records reveal that there are 44 space station licensees. We do not request or collect annual revenue information concerning such licensees, and thus are unable to estimate the number of geostationary space station licensees that would constitute a small business under the SBA definition cited above, or apply any rules providing special consideration for geostationary space station licensees that are small businesses.

17 GHz Transmitting Earth Stations. Currently there are approximately 47 operational earth stations in the 17.3-17.7 GHz bands. The Commission does not request or collect annual revenue

(Continued from previous page) _____

establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.” 5 U.S.C. § 601(3).

⁷ Small Business Act, 15 U.S.C. § 632 (1996).

⁸ 13 CFR § 121.201, NAICS code 517410.

⁹ U.S. Census Bureau, 2002 NAICS Definitions, “517410 Satellite Telecommunications”; <http://www.census.gov/epcd/naics02/def/NDEF517.HTM>.

¹⁰ See http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&skip=900&-ds_name=EC0751SSSZ4&-lang=en.

¹¹ *Id.* An additional 38 firms had annual receipts of \$25 million or more.

¹² U.S. Census Bureau, 2007 NAICS Definitions, “517910 Other Telecommunications”; <http://www.census.gov/epcd/naics02/def/NDEF517.HTM>.

¹³ See 13 CFR § 121.201, NAICS code 517919.

¹⁴ *Id.*

information, and thus is unable to estimate the number of earth stations that would constitute a small business under the SBA definition.¹⁵

E. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities

Under the Commission's existing rules, all requests for space station authorizations are required to be in the form of a comprehensive proposal submitted on the relevant FCC forms.¹⁶ Similarly, to obtain an earth station authorization, applicants must file the appropriate forms as required by the Commission's rules.¹⁷ In addition to our existing requirements, in this Third Report and Order we adopt certain specific requirements for 17/24 GHz BSS earth and space station applications.

Earth Station Applications. Applications for feeder-link earth stations operating in the 17.3-17.8 GHz band (Earth-to-space) and providing service to geostationary satellites in the 17/24 GHz BSS must include, for each new or modified earth station, a certificate of coordination agreement with any holder of a blanket license for BSS receive earth terminals located within a coordination distance of the feeder-link earth station established by ITU rules.

The Commission does not expect significant costs to be associated with these rules. Therefore, we do not anticipate that the burden of compliance would be greater for smaller entities.

F. Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

The RFA requires that, to the extent consistent with the objectives of applicable statutes, the analysis shall discuss significant alternatives such as: (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.¹⁸

The rules adopted herein are necessary to protect 17/24 GHz BSS subscribers from DBS feeder links (ground-path interference). These rules will enable the efficient operation of the 17/24 GHz BSS, which is expected to introduce a new generation of broadband services to the public, and ensure that consumers enjoy the continued uninterrupted operation of DBS.

The technical rules adopted here are the least intrusive option considered in terms of compliance requirements and will be the most effective in terms of facilitating the licensing of operations in the 17/24 GHz BSS without causing harmful interference to other authorized radiocommunication services. We have considered alternatives, including subjecting existing DBS uplink facilities to new interference-mitigation requirements and establishing protection zones for existing DBS uplink facilities, and believe the rules as adopted provide the most equitable solution to the potential interference problems posed by the operations in 17/24 GHz BSS. By requiring that technical showings be made prior to operation, we anticipate that there will be far fewer instances of harmful interference between these two services. This will have a positive economic impact on all satellite space station and earth station licensees, including small entities.

¹⁵ The SBA has developed a small business size standard for Satellite Telecommunications, which consists of all such companies having \$13.5 million or less in annual receipts. 13 CFR § 121.201, NAICS code 517410.

¹⁶ See 47 CFR § 25.114.

¹⁷ See 47 CFR § 25.115.

¹⁸ 5 U.S.C. § 603(c)(1), (c)(4).

G. Federal Rules that May Duplicate, Overlap, or Conflict With the Proposed Rules

None.

Report to Congress: The Commission will send a copy of the Report and Order, including this FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act. In addition, the Commission will send a copy of the Report and Order, including this FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the Report and Order and FRFA (or summaries thereof) will also be published in the Federal Register.¹⁹

¹⁹ See 5 U.S.C. § 604(b).